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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Steven Joseph King

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10/31/2005

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EXAMINER

SETH, MANAV

ART UNIT

PAPER NUMBER

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	✓ 10/081,127	KING, STEVEN JOSEPH	
	Examiner	Art Unit	
	Manav Seth	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 June 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 6 and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 6 and 18 recites superpositioning of the first image and the second image. However, the specification does not teach superpositioning.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 7-9, 11-12, 15-16, 19-21, 23-24, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley, U.S. Patent No. 4,806,776.

Regarding claim 1, Claim 1 recites a method which comprises of illuminating a target under different lightning conditions where these lightning conditions are fulfilled by different light

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illumination sources which sequentially illuminates the target and images are taken under each different illumination light and then processing these images taken under different lightning conditions using a data processing device and extracting information of interest about the target.

First of all, it is a well-known fact in the art of image processing that images taken under different lightning conditions would provide different contrasts and such a fact is generally used by professional photographers in everyday imaging. Different lights produce different contrast and thus provide an advantage of using this concept in various inspection applications of the objects. This same concept has been used by Kley which by processing images taken under different lightning conditions, determine the characteristics of the objects. Kley, with respect to different embodiments of the invention, discloses "One or more of the units 1346, 1348, 1350, 1350, 1354, and 1356 can be operated during the alternate successive scans to produce differential images indicating differences in the images produced by different angles of illumination by different polarities of illumination, different phases of illumination, different colors of illumination, different phase changes of portions of the illumination, or different patterns of operation of the phase of illumination. In a variation illustrated in figure 83, a computer 1376 samples and processes the video signal from the television camera 1340 and displays processed video signals on monitor 1358. The computer 1376 is programmed to form differential images by digital techniques from successive frames of the video signal from television camera 1340. One particular application of the electronic illumination control employing oblique light units 1352 and 1354 to illuminate an object such as a printed circuit board 1378 is shown in fig. 84. The use of alternate light units wherein at least one of the units is oblique, produces differential images which contain information regarding the height of the structures of the object in addition to

the normal two-dimensional information concerning width and length of structure in the object being viewed” (col. 37, lines 12-60; figures 81-100; col. 38, lines 47-60).

Regarding claims 2-4, limitations recited in claims 2-4 have been discussed in the rejection of claim 1. Claims 2-4 have been similarly analyzed and rejected as per claim 1.

Claim 7 recites “the method of claim 1 wherein the first illumination source comprises using a diffuse on-axis light source”. As discussed in the rejection of claim 1, Kley suggests of using different kinds of light sources and examiner further asserts that “diffuse on-axis light source” (DOAL) is very well-known to be used for illumination purposes (official notice taken). With the DOAL’s illumination, light rays reflect off a beam splitter on to an object at nearly 90 degrees and further providing uniform light output eliminating glare and shadows and this provides standard use of DOAL in applications that involve the inspection of objects with reflective surfaces.

Claim 8 recites “the method of claim 1 wherein the at least a second illumination source comprises an ultraviolet light source”. The use of ultraviolet light source to image a target object is very well known. Kley discloses the use of ultraviolet light source (col. 39, lines 21-26).

Claim 9 recites “the method of claim 8 further comprising the act of providing a filter disposed between the target and at least a second illumination source to block visible light”. It is well known that ultraviolet light and visible light are part of the light spectrum where ultraviolet light range starts from 400nm and goes lower and visible light range starts at 400nm to 700nm. The violet color in the visible range lies at the intersection of 400nm and practically between 390nm and

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410nm such that violet being a part of ultraviolet as well as visible range. Therefore, taking this concept in consideration, inventors have been using band pass filters that completely blocks ultraviolet light which is less than 410 nanometers where specifically and completely blocking only visible light which is greater than 390nm where specifically ultraviolet based imaging is required. Kley as discussed before discloses the method of illuminating the object sequentially under different lightning condition for improving the visibility of objects being examined (col. 1, lines 34-42; col. 2, lines 13-17). Therefore, if one visible light source and one ultraviolet light source are used sequentially, it is has to be made sure that ultraviolet is pure ultraviolet, it does not recite visible portion of the spectrum. Therefore, a visible filter is apparently required to do so and this is well known to be done if only UV light imaging has to be performed (official notice taken). UV light imaging not only provides better optical resolution, but also better material identification due to strong variations in reflectivity and absorption of UV light by materials, strong scattering, higher orders of diffraction, and fluorescence in the UV spectrum, which would not be possible if visible spectrum is associated with UV spectrum. Further, Kley does provide different polarizers between the illumination source and the target (figure 93).

Claim 11 recites “the method of claim 1 further comprising the act of providing a filter disposed between the camera and the target”. Kley discloses “In alternative embodiments the color control unit 1446 can have additional frequency **band pass filters**, or can have band pass filters for non-visible frequencies such as infrared or ultraviolet light **where the camera 1340 is sensitive to such radiations** (col. 39, lines 22-30). The instant invention **recites the use** of well-known band pass filters to block a particular spectrum of light, not the design of these band pass filters. The use of band pass filters is very well known to be used to in front of cameras and light sources to block a

particular spectrum of frequencies and it depends on user's specific design choice of selecting the band pass filter depending on what frequency band to be blocked and what needs to be passed on.

Claims 12 has been similarly analyzed and rejected as per claim 11.

Claims 15 and 16 have been similarly analyzed and rejected as per claims 1-3.

Claims 19, 20 and 21 have been similarly analyzed and rejected as per claims 7, 8 and 9.

Claims 23-24 have been similarly analyzed and rejected as per claims 11, 12 and 15.

Claims 27 and 29 has been similarly analyzed and rejected as per claims 1-3, 7-9 and 11-12.

5. Claims 5-6 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley, U.S. Patent No. 4,806,776, and further in view of Kubisiak et al., U.S. Patent No. 3,710,128.

Claim 5 recites "the method of claim 1 wherein extracting information of interest about the target comprises determining an edge of at least a portion of the target". Detecting an edge of the object using image processing has been well known and has been used widely in fields such as object tracking, object inspection, etc. Kley as discussed in the rejection of claim 1 discloses "One particular application of the electronic illumination control employing oblique light units 1352 and 1354 to illuminate an object such as a printed circuit board 1378 is shown in fig. 84. The use of alternate light units wherein at least one of the units is oblique, produces differential images which contain information regarding the height of the structures of the

object in addition to the normal two-dimensional information concerning width and length of structure in the object being viewed” (col. 37, lines 29-40). It is clear from the above disclosure by Kley, that Kley determines width and length of the object and as well known these do parameters totally identify the edges of the object. Kley does not specifically disclose of determining the edges of the object, therefore examiner cites Kubisiak. Kubisiak discloses obtaining an edge of the object using two different light source 9col. 9, lines 59-68 through col. 10, lines 1-16; col. 2, lines 47-55; col. 3, lines 35-65; col. 4, lines 43-68 through col. 5, lines 1-40). Therefore it would have been obvious for one of ordinary skill in the art at the time of invention was to use Kubisiak’s teachings in the invention of Kley because both references are directed to measuring the dimensions of the object under different illumination sources and Kubisiak’s method of determining edge of the object would provide a better accuracy (See Kubisiak, col. 2, lines 35-46).

Claim 6 recites “the method of claim 3 wherein processing said first and at least a second image using a data processing device comprises superpositioning of the first image and the second image”. Kubisiak discloses superpositioning of the two image signals (col. 4, lines 43-68 through col. 5, lines 1-40).

Claims 17 and 18 have been similarly analyzed and rejected as per claims 5 and 6.

6. Claim 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley, U.S. Patent No. 4,806,776, and further in view of Ausschnitt et al., U.S. Patent No. 5,914,784.

Claim 5 recites “the method of claim 1 wherein extracting information of interest about the target comprises determining an edge of at least a portion of the target”. Detecting an edge of the

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object using image processing has been well known and has been used widely in fields such as object tracking, object inspection, etc. Kley as discussed in the rejection of claim 1 discloses **“One particular application of the electronic illumination control employing oblique light units 1352 and 1354 to illuminate an object such as a printed circuit board 1378 is shown in fig. 84. The use of alternate light units wherein at least one of the units is oblique, produces differential images which contain information regarding the height of the structures of the object in addition to the normal two-dimensional information concerning width and length of structure in the object being viewed”** (col. 37, lines 29-40). It is clear from the above disclosure by Kley, that Kley determines width and length of the object and as well known these do parameters totally identify the edges of the object. Kley does not specifically disclose of determining the edges of the object, therefore examiner cites Ausschnitt. Ausschnitt discloses **“determination of the location of the object edge may include comparing the image signal profiles of the object edge at the different phases or different light colors”** (col. 3, lines 47-50). Therefore, it would have been obvious for one of ordinary skill in the art at the time invention was made to use Ausschnitt’s teachings in the invention of Kley because both references teach evaluation of the object under different lighting conditions. Kley does teach measuring the dimensions of the object and Ausschnitt’s teaching’s further provide the improved method of detecting and measuring edges of features which would produce sharper edges (See Ausschnitt, col. 3, lines 2-6).

7. Claims 10 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley, U.S. Patent No. 4,806,776, and further in view of Murnaghan Instruments (hereinafter **Murnaghan**), 1999, “UV35 Ultraviolet Passing – Visible blocking CCD filter”.

Claim 10 recites “the method of claim 9 wherein the filter blocks wavelengths of lights greater than 390 nanometers”. Kley does not teach a filter that blocks wavelengths of light greater than 390 nanometers. Ultraviolet pass camera filters are general service filters that block ultraviolet light, which can cause a hazy look, and serve to protect more expensive lenses. However, Murnaghan does teach a filter, that blocks wavelengths of light greater than 390 nanometers (page 2, line 1, “Transmittance ends: 390nm”). Therefore, it would have been obvious for one of ordinary skill in the art to use Murnaghan’s filter in the invention of Kley as it would block visible spectrum and despite of the fact where it is used would block visible spectrum and pass ultraviolet light.

Claim 22 has been similarly analyzed and rejected as per claims 10 and 21.

8. Claims 13-14 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley, U.S. Patent No. 4,806,776 and further in view of **Schneider** Optics, 1999, “Filters for Motion pictures and television”.

Claim 13 recites “the method of claim 12 wherein the filter blocks light less than 410 nanometers”. As discussed in claim 11, Kley does teach blocking ultraviolet light but does not specifically teach blocking light less than 410 nanometers. It is well known that ultraviolet light and visible light are part of the light spectrum where ultraviolet light range starts from 400nm and goes lower and visible light range starts at 400nm to 700nm. The violet color in the visible range lies at the intersection of 400nm and practically between 390nm and 410nm such that violet being a part of ultraviolet as well as visible range. Therefore, taking this concept in consideration, inventors have been using band pass filters that completely blocks ultraviolet light which is less than 410 nanometers where specifically and completely blocking only visible light which is greater than

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390nm where specifically ultraviolet based imaging is required, for better accuracy of images. Schneider further teaches such a ultraviolet blocking filter UV-410 which filters out ultraviolet light below 410nm (page 20, lower right hand corner). Therefore, it would have been obvious for one of ordinary skill in the art to use Schneider's ultraviolet filter in the invention of Kley as Schneider's filter would filter out ultraviolet light below 410 nm, blocks the blue cast, penetrates haze and permits to capture vivid colors and shaper detail.

Claim 14 recites "the method of claim 13 wherein the filter blocks at least one portion of the visible light spectrum". Claim 14 has been similarly analyzed and rejected as per claim 13.

Claims 25 and 26 have been similarly analyzed and rejected as per claims 13-15 and 23.

9. Claims 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kley, U.S. Patent No. 4,806,776, and further in view of Takeuchi et al., U.S. Patent No. 6,337,767.

Regarding claim 28, all the limitations have been covered by Kley, except "providing a filter disposed between the camera and the target, which filter blocks visible light". However, Takeuchi teaches such a filter which blocks visible light, disposed between the imaging device and target (col. 3, lines 25-35). Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention was made to use Takeuchi's teaching's in the invention of Kley becasue both references are directed to the analysis of the object under different light conditions and Takeuchi's invention provides the possible versatile use (application) of the teachings provided by Kley.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Shafer et al., U.S. Patent No. 5,717,518, discloses a broad spectrum ultraviolet catadioptric imaging system.
- Guest et al., U.S. Patent No. 6,252,981, discloses a method and apparatus for selection of reference die.
- Kenet et al., U.S. Patent No. 5,016,173, discloses a method and apparatus for monitoring visually accessible surfaces of the body.
- Oshio, U.S. Patent No. 5,448,453, discloses vehicular headlamp providing near-ultraviolet radiation.
- Schedewie, U.S. Patent No. 3,764,218, discloses light beam edge detection.
- Sasaki et al., U.S. Patent No. 5,729,216, discloses an apparatus for monitoring vehicle periphery.
- Toda et al., U.S. Patent No. 5,463,697, discloses an apparatus for detecting an edge of an image.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (571) 272-7456. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MS
Manav Seth
Art Unit 2625
October 21, 2005


KANJIBHAI PATEL
PRIMARY EXAMINER